

DOCUMENT RESUME

ED 270 612

CE 044 561

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TITLE Using Cost/Contact Hour for Comparing Productivity
between Two Adult Education Programs.
PUB DATE Mar 85
NOTE 27p.; Ed.D. Practicum, Nova University.
PUB TYPE Dissertations/Theses - Practicum Papers (043) --
Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Accountability; *Adult Education; Adult Students;
Consumer Education; *Cost Effectiveness; Educational
Finance; Home Economics; *Outcomes of Education;
Postsecondary Education; *Productivity; *Program
Costs; Program Effectiveness; School Effectiveness;
Vocational Education
IDENTIFIERS *Contact Hours

ABSTRACT

Adult and continuing education programs use an established accountability system that includes an expectation of productivity, whereas other educational programs focus accountability on attainment of stated goals and objectives. As education addresses economic constraints by combining educational programs, these differences in accountability expectations will require a system amenable to the intent of the total program, thereby involving all of the funding agencies. This study compares the productivity measure of cost per contact hour between two educational programs where one program operates by the productivity expectation and the other does not. The 28 Vocational Education Act (VEA) Adult Consumer and Homemaker Education projects (without the productivity expectations) are compared to 28 projects in the Adult Education Act (AEA) Program, which uses the cost per contact hour productivity expectation. In order to determine whether the AEA project's cost-effectiveness is significantly lower, the project costs were divided by the total contact hours generated in fiscal year 1984 for the 56 projects. The two-tailed independent t-test, at the .05 level of significance, shows that the difference in cost per contact hour between the two programs is statistically significant. The program with the productivity expectation operates at a significantly lower cost per contact hour. The results have assured the development of expectation for productivity in the VEA adult program. A system is now being developed that includes an adjusted cost per contact hour, an established standard for teacher output, and a designated cost factor to cover program costs. (Author/KC)

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ED270612

USING COST/CONTACT HOUR FOR COMPARING PRODUCTIVITY
BETWEEN TWO ADULT EDUCATION PROGRAMS

Applied Educational Research
and Evaluation Seminar

by

Alice F. Dyer

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A Practicum presented to Nova University in
partial fulfillment of the requirements
for the degree of Doctor of Education

Nova University

March 1985

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ABSTRACT

Adult and continuing education programs utilize an established accountability system which includes an expectation of productivity whereas other educational programs focus accountability on attainment of stated goals and objectives. As education addresses economic constraints by interfacing educational programs, these differences in accountability expectations will cause programs to seek a system amenable to the intent of the total program thereby involving all of the funding agencies. This study compares the productivity measure of cost per contact hour between two educational programs where one program operates by the productivity expectation and the other does not. The 28 VEA Adult Consumer and Homemaker Education projects (without the productivity expectations) are compared to 28 projects in the AEA Program which has the cost per contact hour productivity expectation. In order to determine whether the AEA project's cost-effectiveness is significantly lower, the project costs were divided by the total contact hours generated in FY1984 for the 56 projects. The two-tailed independent t-test, at the .05 level of significance, shows that the difference in cost per contact hour between the two programs is statistically significant. The program with the productivity expectation operates at a significantly lower cost per contact hour.

The results have assured the development of expectation for productivity in the VEA adult program. A system is now being developed which includes an adjusted cost per contact hour, an

established standard for teacher output, as well as a designated cost factor to cover program costs.

INTRODUCTION

"Quantitative measures of the performances of continuing education programs and administrators can provide a basis for analysis and decision making . . ."(Dickinson,1985:16). Dickinson's approach to quantitative measures includes the rationale for productivity concepts and indicators for providing objective measures of performance. This business and marketing orientation is an aggressive and creative approach to resource allocation in continuing education. The traditional educational approach, which has emphasized identifying and meeting the learning needs of the individual and community, is subsumed in the business and marketing approach.

New legislation at the state and national levels has changed the funding focus and program direction in the Office of Occupational and Continuing Education in New York State. In facilitating a partnership between federally funded Vocational Education Act (VEA) adult programs and federally funded Adult Education Act (AEA) programs, the differences in accountability systems within these programs create a tremendous imbalance of expectations. One program in particular, the VEA Adult Consumer and Homemaker Education Program, now a program component in the Bureau of Adult and Continuing Education Program Development, must initiate an accountability system with expectations congruent with continuing education programs.

The Statement of the Problem

The purpose of this study is to compare two adult and continuing education federally funded programs using the productivity measure of cost per contact hour (cost/contact hour), one of Dickinson's productivity indicators. The AEA programs operate under this productivity measure; the VEA adult education projects work under a traditional orientation of fulfilling stated objectives. The annual reports of the VEA projects do, however, include the information to produce a productivity measure of cost/contact hour; it just has never been an expectation to measure productivity. What, then is the difference in cost/contact hour between two adult education programs where one operates by a productivity standard and the other does not? Does a productivity expectation of cost/contact hour produce a more cost effective program?

The Research Hypothesis

There is a significantly lower cost per contact hour in adult education programs with an expected productivity measure (AEA programs) than for those programs without a productivity measure (VEA programs).

Background and Significance of the Study

A review of the literature from mid-seventies to the present illustrates that the promotion of productivity in education is not only new; it appears to have evolved. There has been a shift from questioning whether education can be evaluated to how it should be

evaluated (Shipp, 1982). The movement toward acceptance and actual promotion of a concept of productivity in education presents a challenging scenerio brought on by the end of the period of educational reform by addition.

Americans have been proud to support their educational system, believing that through education the quality of life for their children will be higher. And, education has represented jobs; more education has represented better jobs. However, the 19 year decline in Scholastic Aptitude Test scores, along with a perceived deterioration of education; the slowdown in economic growth in the United States, along with steady economic gains in Japan and West Germany; and complaints by businesses and colleges that high school graduates are functionally illiterate (Bevoise, 1983), along with figures projecting 57 million American adults being classified as functionally illiterate (Belz, 1984), have provided evidence to the legislative body and the taxpayer that this multi-billion dollar education business is not living up to expectation. The unemployment rate, decreased enrollments, and increased delinquency, drug abuse and teen suicides is totally incongruent with the aims of education for quality of life, thus eroding the confidence and trust once placed in education. The efficacy of education on faith has been exploited. No longer can school officials wait for the money to arrive; administrators must be aware of public concern and must work for the restoration of confidence and trust in education (Planning, 1983). This is not to be an easy task when the situation is considered: a Gallup Poll showed only 12% of those citizens surveyed as claiming to know the cost of educating a child for one year. Those revealing a figure were well below the real cost (Gonder,

1980). Would knowing that it cost approximately \$4,000 (closer to \$5,000 in New York State) to educate a child per year in the public schools of America further violate the trust? Or, could it be explained that these figures are based on school attendance therefore it is necessary for children to be in school - attending - to be cost effective for education.

Many within educational circles identify education problems with decreased budgets. However, there are those who are willing to examine their accountability. Hymes (1982) asks the question: "Is lack of money the real cause of the budget crunch, or does the reason go far deeper?". Boone, Fox and Joseph (1979) posit the overriding question for continuing education: are programs positively contributing to the quality of life of the participants? "The need to assess the impact of adult and continuing education programs is one of the most important challenges confronting continuing education" (Boone et al:49). As education is in competition for financial resources with the demand for services by elderly and handicapped citizens and for law enforcement (Hymes:7), it is imperative that programs are accountable for program outcomes "to the program user as well as to those who allocate funds" (Boone et al). Sjogren in endorsing assessment of impact clearly identifies some of the shortcomings of traditional educational program evaluation. Generally educational programs have broad goals which are a statement of purpose. Objectives derived from the goals are achieved via various activities. "The expectation is, of course, that if the objectives are attained the goals will be reached. Unfortunately, the direct relationship between the objectives and the goals is not necessarily well supported by empirical

evidence"(Sjogren,1979:110). In fact, Hentschel refers to a discrepancy between evaluation in program development and its application in the field. Impact assessment would provide more beneficial evidence in determining whether a program contributes to the achievement of the individual or societal goals. According to the evidence presented by these resources, education can provide a system more accountable for its actions.

Shipp and Knox give more breadth to evaluation by proposing assessment for both financial and nonfinancial information. A good program approach would be to use several types of evaluation measures:

1. summative evaluation - indicating the extent to which the objectives were achieved
2. formative evaluation - suggesting why the objectives were or were not achieved, which is never required
3. impact evaluation - the extent to which the educational program has societal or community benefit. Impact evaluation reflects the true value, or return on the dollar spent, by showing a cost recovery.

The difficulties in measuring program output has been that past evaluations relied upon a happiness rating of participants and/or assessing the worth or accomplishments of objectives. This presentation of mixed criteria with no standard produces results of little worth for financial evaluation. Diverse programs with varied funding levels, which address geographic needs with designated staff, must measure output by using the established criteria, the givens:

- money distributed
- hours of instruction
- number of participants
- number of courses taught (Shipp, Dickinson)

Use of standards makes it possible to anticipate, plan and analyze program costs and recognize reasons for differences. In considering total program costs, fees for courses can be set and managerial accounting decisions can be made. However, the most "convenient and accurate index" to use in cost-benefit and effectiveness analysis is the cost/contact hour which reflects unit price, unit costs (Shipp:73).

Anderson and Kasl used the cost/contact hour as a proxy for the amount learned and applied (Knox,1982:43). There is a very significant relationship between hours of instruction and achievement as established by a New York State two-year study in Adult Basic Education (1965-67). Student learning increases in relationship to the number of hours spent in learning, however that fact is secondary to the concept of cost/contact hour for financial evaluation; or according to Dickinson, productivity. Cost/contact hour has become a standard of measure in continuing education because program benefits are most often nonmonetary and nonquantitative. It is common for federally funded projects and programs in continuing education to receive allocations based on monthly attendance figures in relation to monthly expenditures. Increases and decreases in annual funding are based on these accountings. Again, it is the participant learning hours that substitute for the lack of quantitative information to demonstrate participant learning and the benefits to themselves and others.

When such measures as cost/contact hour prove to generate increased program results, then productivity, aggressive financial management and a business and marketing approach to accountability will have made an impact on education. Productivity has been established as a method of accountability in adult and continuing education. As other established programs increasingly become involved with the adult education world, the impact of productivity on their accountability systems may become more viable.

Cost of education is an issue brought on by societal and economic factors as well as by unmet expectations from education. The resources cited in this study clearly illustrate that cost also is a concern within education, particularly in adult and continuing education. The VEA Adult Consumer and Homemaker Education Program is a continuing education program and can adhere to the rigors of accountability via a productivity measure using the indicator of cost/contact hour. The results of this study, the results of cost/contact hour as an accountability expectation, will change very dramatically the process by which these VEA adult projects now operate.

Definition of Terms

Accountability - refers to the liability and responsibility for carrying out a program as stated.

Accountability systems - in education these are the procedures used for showing the benefit of a program , generally involved has been some process of a formative type evaluation.

Cost effective - in education refers to getting the most results for the dollar spent therefore the reference includes positive learning results for the least amount of money spent in the least amount of time.

Cost per contact hour - is the productivity standard derived by dividing the cost of the teaching by the number of hours the student spent in instruction.

Financial evaluation - involves assessing the program not just from the standpoint of delivery of services yet includes assessing the dollars required to deliver the services.

Functionally illiterate - refers to those not having ample basic skills (reading, writing, arithmetic) to carry out tasks for living which include maintaining a job life, personal life, community life and in relation to the government and laws.

Impact evaluation - involves the assessment of a program to determine whether or not it contributes to the achievement of individual or societal goals while taking into account the program costs to achieve the overall goals.

Nonmonetary benefits - would include program results that do not have an assigned dollar value, yet are positive learning behaviors

such as a parenting course for child abusers resulting in the adults not hitting or screaming at the child.

Productivity concepts - are the standards by which inputs and outputs can be systematically arranged in order to identify a benefit or loss.

Quality of life - is the standard of living at which success or accomplishment is indicated. The American quality of life includes fulltime work, health benefits, an automobile, home/family and some leisure time.

Quantitative measures - are the indicators used in order to assign cost values to projects or activities such as number of students, number of courses, hours of instruction and the program costs.

Resource allocation - is the process of assigning monies to projects or activities.

Traditional educational evaluation approach - is based on conducting activities which are related to project objectives; objectives in turn are derived from the goals. The assumption has been that in accomplishing the activities, the objectives and therefore the goals have been accomplished.

Limitations of the Study

This research project relates specifically to two federally funded programs where, in both cases, the intent of the legislation is to provide instructional basic education programs to the disadvantaged adult: educationally and economically disadvantaged. The information gathered reflects the fiscal year (FY) 1984 so only those 28

VEA projects funded at that time, along with the corresponding 28 AEA projects, are included in the study. No assumptions are made for other federally funded programs.

The statistical analysis is based on information gathered previously and by two distinctly separate programs so no means of clarifying reported student contact hours was made. Both programs have reported student contact hours on an interim and annual basis for many years, however the instructions provided each program related to their own specific program areas. Each of the 28 VEA projects received one set of directions for maintaining and reporting contact hours while each of the AEA projects received a set of directions. The two sets of directions were not the same. The reported contact hours from both programs were used in the federal accountability reports so the data was viewed as reliable from that standpoint.

Basic Assumptions

Both programs are expected to provide state reports on project activities and accomplishments including participant contact hours. Therefore, the assumption is made that projects have provided the best information possible in their project reviews.

As well, the projects are staffed by certified professionals who, it is assumed, are dedicated to providing the best instruction to the most participants.

In FY1984 the Consumer and Homemaker Education Program was not located within the Bureau of Adult and Continuing Education Program Development therefore it is assumed that even though the project comparisons include the VEA and AEA projects from the same

location, the two projects functioned independently due to different expectations, different directions and separate staffs.

Procedures for Collecting Data

The 28 FY1984 annual reports for the Consumer and Homemaker projects provided the number of contact hours generated for each project during that year. The state program files provided financial grant information. By dividing grant awards by contact hours, the 28 project cost/contact hours were ascertained.

The same procedure was followed to obtain the AEA project cost/contact hour determinations. Since both statewide annual data reports are prepared by the same person, any instances of seemingly incongruent patterns have been monitored.

The total population of 28 VEA projects, with the corresponding 28 AEA projects are used for analysis. The total population of AEA projects numbers 184. The decision to select the 28 corresponding projects resulted due to the diversity of the state, the extreme range in cost of instruction and the makeup of the 28 projects:

- big 5 cities: NYC, Yonkers, Buffalo, Syracuse, Rochester
- 5 Long Island projects
- remaining 18 projects are provided by either occupational centers or a local school district.

Procedures for Testing Data

The purpose of the research is to prove that there is a significantly lower cost per contact hour in adult education programs with an expected productivity measure compared to those programs operated

without a productivity measure.

A two-tailed independent t-test was conducted to test the null hypothesis of no difference at the .05 level of significance.

Hypothesis testing:

1. The null hypothesis (H_0):

$$H_0: \bar{X}_y = \bar{X}_z$$

z represents the AEA projects and y represents the VEA projects.

2. The alternate hypothesis (H_a):

$$H_a: \bar{X}_y < \bar{X}_z$$

3. The desired level of significance:

$$= .05$$

.05 is the largest risk the experimenter is willing to take of rejecting a true null hypothesis. It is also the level of significance desired to warrant an alternative accountability system development.

4. The degree of freedom:

$$df = n_y + n_z - 2$$

$$df = 28 + 28 - 2 = 54$$

5. The critical t-value and region of rejection:

The critical t-value with 60 degrees of freedom at the .05 level for a two-tailed test is 2.000 (the reading at 40 df is 2.021 representing the next reading of degrees of freedom from Table III of Fisher and Yates). Therefore, the H_0 is rejected and the H_a accepted if $t \geq 2.000$.

6. The formula was applied:

$$t = \frac{\bar{X}_z - \bar{X}_y}{\sqrt{\frac{d_z^2 + d_y^2}{n_z + n_y}}}$$

7. Results:

$$t = 3.70 \quad \text{where} \quad \bar{X}_z = \$2.50 \quad \text{and} \quad \bar{X}_y = \$9.02$$

Data Resulting from the Study

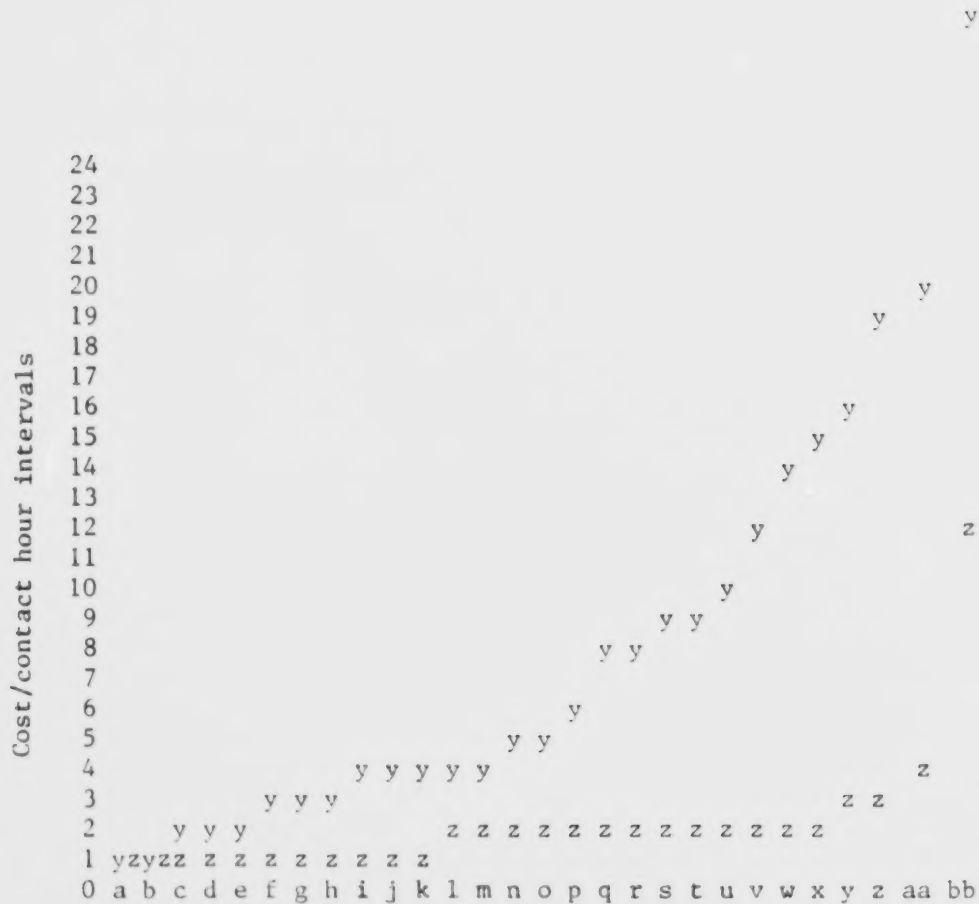
The research rejects the null hypothesis of $t = 2.000$ since by computation $t = 3.70$; therefore, the alternative hypothesis is accepted: $H_a: \bar{X}_y < \bar{X}_z$. The null hypothesis is rejected at the .05 level of significance, and as noted by the table, could also have been rejected at the .01 level of significance as well.

The mean scores indicate the differences in expectations where the $\bar{X}_z = \$2.50$ and $\bar{X}_y = \$9.02$. Also of note is the standard deviations from the mean: $sd_z = 1.03$

$$sd_y = 8.92$$

The determined cost/contact hour for the 28 VEA and 28 AEA projects as used in the t-test computations is found in Appendix A. Only the values are presented; projects are not assigned to the designated values. A graph depicting the FY1984 cost/contact hour for the two programs is presented. The vertical indicators are cost/contact hour in one dollar increments with the project progression

of the scores found on the baseline. The graph is a development of the information presented in Appendix A.



Graph 1. Dispersion of the two sets of 28 scores where z = AEA and y = VEA cost/contact hour.

Significance of the Data

The research shows a statistically significant difference between the cost/contact hour for the AEA and VEA adult education programs measured by the study. The AEA adult program with the expectation for productivity is significantly lower than the VEA adult program which operates without the productivity expectation of cost effectiveness in cost/contact hour. The research hypothesis, then, is supported by the findings.

Graph 1 illustrates not only the differences between the cost/contact hours between the AEA and VEA projects, it also clearly shows the closeness to the mean in the dispersion of AEA project scores (costs). Where there is no expectation of cost effectiveness, the relationship to the mean does not reflect the same closeness. Too many extreme scores influenced the VEA mean as indicated by the graph and a standard deviation of 8.92 as compared to the AEA standard deviation of scores at 1.03.

The support by the literature for a cost/contact hour productivity factor in adult and continuing education, along with the research findings will result in the development of a cost/contact hour productivity measure within the VEA adult program accountability system. As previously stated, diverse programs with varied funding levels, which address geographic needs with designated staff, must measure output by using the established criteria; that criteria includes project cost as well as numbers of teaching hours and numbers of students attending which are the factors necessary to compute the

cost/contact hour.

Conclusions and Implications

It has been shown that the VEA Adult Consumer and Homemaker Education Program operates at a significantly higher cost/contact hour than the comparison AEA Program. Developing an accountability system with productivity expectations would be highly recommended. One such accountability system for productivity which could be developed is initiation of a cost/contact hour expectation. A great deal of change would be needed at the state and local levels in order to do this. The administration must support the development of a formula for funding determination based on local teacher cost, establish a standard for teacher output in contact hours and establish a guide for attendance. The administration at New York State Education Department has given support for this development, facilitated the development of models and the program coordinator is now contracting with the local programs for funding levels based on productivity indicators including cost/contact hour, contracted number of contact hours to be generated, including a 10% project cost, toward establishing contracted grant awards.

The cost/contact hour discrepancy between the two programs prompted further inspection of the process determining cost/contact hour. The VEA \$9.02 figure was obtained by dividing the total contact hours into the total grant therefore including costs for supplies, support staff and administration along with teacher costs. It was determined that another procedure must be established. The system

now involves determining a project cost/contact hour based on cost of instruction alone, meaning the teacher salary and fringe is divided by projected number of contact hours. A 10% project cost has been added to all projects to handle support, supply and administrative handling costs. Based on FY1985 figures using the adjusted method of determination, the cost/contact hour would be $\bar{X}_y = \$4.80$. This would reduce the project grant awards causing local decision-makers to reassess their position for programming. More generation of contact hours will yield more dollars however the program must be positioned so that it will generate. A basic assumption has been made, a guide for programs to work toward:

1 FTE x 5.5 hr of instruction x 180 da x 10 av attend = 10,000 cont hr.
(One full time teacher, teaching 5.5 hours a day for 180 school days with an average attendance of 10 students per class is equivalent to 1,000 teaching hours and 10,000 student contact hours.)

Programs can contract for parttime teachers, teachers on hourly or contract pay, as well as assign positions with instructional and/or administrative responsibility. The programs know that there is a productivity expectation in VEA Adult Consumer and Homemaker Education projects as there is the AEA projects. It is anticipated that this first year will be a year of transition with adjustments needed in the second year. By the third year projects will be more comfortable with productivity negotiations and will have adjusted programs to serve more disadvantaged adults in more cost effective ways.

Further study will be needed to track the project operations paying close attention to increases and decreases in classes, class size, program length, instructional hours, contact hours and so on.

It is anticipated that the VEA projects will spend more time in instruction as well as implement more adult education strategies for teaching. When instruction does not answer the needs of adults, chances are good that the adult will not return to those classes. And, the adults are needed in the classes in order to generate the contact hours to carry on the program.

It should be noted that to carry out an accountability system for productivity in this adult education program, emphasis will be shifted toward identifying and meeting the needs of the disadvantaged rather than carrying out a more traditional subject-orientated approach. This approach will bring about teacher needs: needs for knowing how to facilitate learning, needs for impact programming and evaluation, and needs for skills in assessing student learning needs.

It has not been difficult to determine the statistical significance between the expectations for productivity in these programs; it has been difficult developing a system, yet to be field tested, which promotes equity, diversity and productivity for 28 projects which for over fifteen years have perpetuated a system of the 60's. It appears that productivity is something that has to be done; it is not something that wants to be done.

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APPENDIX A
COST/CONTACT HOUR DATA

COST/CONTACT HOUR DATA

Consumer and Homemaker Program mean: $\bar{X}_y = \$9.02$

Adult Education Program mean: $\bar{X}_z = \$2.50$

Consumer and Homemaker
Scores:

	d	d ²
46.09	37.07	1374.19
20.80	11.78	138.77
19.11	10.09	101.81
16.17	7.15	51.12
15.83	6.81	46.38
14.91	5.89	34.69
12.48	3.46	11.97
10.07	1.05	1.10
9.84	.82	.67
9.13	.11	.01
8.47	-.55	.30
8.19	-.83	.69
6.99	-2.03	4.12
5.69	-3.33	11.09
5.65	-3.37	11.36
4.77	-4.25	18.06
4.50	-4.52	20.43
4.20	-4.82	23.23
4.20	-4.82	23.23
4.04	-4.98	24.80
3.96	-5.06	25.60
3.86	-5.16	26.63
3.59	-5.43	29.49
2.87	-6.15	37.82
2.44	-6.58	43.30
2.40	-6.62	43.82
1.75	-7.27	52.85
.59	-8.43	71.07

$$\sum d^2 = 2228.60$$

$$sd = 8.92$$

Adult Education
Scores:

	d	d ²
12.07	9.57	91.58
4.59	2.09	4.37
3.66	1.16	1.35
3.02	.52	.27
2.96	.46	.21
2.87	.37	.14
2.72	.22	.05
2.71	.21	.04
2.66	.16	.03
2.58	.08	.006
2.43	-.07	.005
2.37	-.13	.017
2.32	-.18	.032
2.10	-.40	.16
2.10	-.40	.16
2.05	-.45	.20
2.01	-.49	.24
1.95	-.55	.30
1.90	-.60	.36
1.89	-.61	.37
1.81	-.69	.48
1.65	-.85	.72
1.23	-1.27	1.61
1.09	-1.41	1.99
1.09	-1.41	1.99
1.02	-1.48	2.19
.77	-1.73	2.99
.36	-2.14	4.58

$$\sum d^2 = 116.44$$

$$sd = 2.03$$